THE EFFECT OF ANT ASSOCIATION ON LYCAENID LARVAL DURATION (LEPIDOPTERA: LYCAENIDAE)

By S. F. HENNING*

Abstract

Recent studies on Southern African Lycaenidae have shown that the duration of the larval stages is significantly increased in myrmecophilous species when compared to non myrmecophilous ones. Several examples are discussed and it is suggested that the extended duration of the larval stages is an adaptation to life within an ants' nest.

Introduction

During recent studies (Henning 1983a, 1983b) on the ant association of certain lycaenid larvae a striking difference was noted between the dependent myrmecophilous species and those not ant associated. This difference is in the duration of the larval stages. The larval stages of *Euchrysops dolorosa* (Trimen), not known to be ant associated, only lasted a total of 19 days, while those of *Aloeides dentatis dentatis* (Swierstra), an ant associated species, may last six months or even a year if diapause takes place. In *Lepidochrysops ignota* (Trimen), another myrmecophilous species studied, the larval stages lasted some 10-11 months.

To explain the above differences in the duration of the larval stages is most difficult because such factors as size, weight, type of food, dependence on ants and so on, all have to be taken into consideration. To discover whether the dependence on ants has anything to do with the duration of the instars one would have to eliminate some of the other possible influencing factors. To do this one would need to select closely related species of similar size feeding on the same foodplant at the same time of the year at the same locality, with the only major difference being their dependency on ants.

Evidence

Euchrysops dolorosa and *Lepidochrysops ignota* appear to fill the above requirements. These two species belong to closely related genera, are about the same size and feed on the flowers of *Becium obovatum* (Benth.) N.E.Br. (Labiatae) during the months September to November at Witpoortjie in the Transvaal. The only major dif-

*Department of Entomology, The South African Institute for Medical Research, Hospital St., P. O. Box 1038, Johannesburg 2000.

ferences between them is that from the third instar onwards *L. ignota* becomes carnivorous and dependent on the ant, *Camponotus niveosetosus* Mayr. The duration of the larval stages differ considerably, that of *E. dolorosa* lasting a total of 19 days and that of *L. ignota* 10-11 months. The duration of the first two instars of *L. ignota*, while they are feeding on the flowers of *B. obovatum*, is equivalent to those of *E. dolorosa*, lasting 8 days. Thus it appears that it is from the 3rd instar onward, when *L. ignota* becomes carnivorous and dependent on its host ant, that factors influencing the duration of instars come into play. Before discussing the implications of this let us look at another example.

Another two species that fill the requirements mentioned above are *Aloeides trimeni* Tite and Dickson and *Aloeides dentatis*. These two species are closely related, belonging to the same genus, they are the same size and feed on the leaves of the plant *Hermania depressa* N.E.Br. (Sterculiaceae) during the months September to January at Witpoortjie in the Transvaal. The only major difference between them is that the larvae of *A. dentatis* shelter during the day in the nest of their host ant, *Acantholepis capensis* Mayr, while the larvae of *A. trimeni* never leave the foodplant. The duration of the larval stages of these two species differs considerably, that of *A. trimeni* lasting some 3 months, and that of *A. dentatis*, which is dependent on ants, lasting 6-12 months.

Discussion

The above two examples suggest that there may be some correlation between dependence on ants and the duration of the larval stages. Change in diet does not appear to be a major factor as *A. dentatis* feeds on the same plant throughout its larval stage as does *A. trimeni* To check that the above observations were not atypical a survey of the literature was made. The most important works consulted were those of Clark and Dickson (1971), Jackson (1937), Hinton (1951), Lamborn (1914) and Farquharson (1922). All these authors described the lycaenid life histories in great detail so that all possible factors influencing the duration of the instars could be taken into consideration. From this literature survey it does appear that lycaenids associated with ants tend to have a much longer larval period than those not dependent on them.

The larval stages of the subfamily Theclinae not dependent on ants have four or five instars lasting some 20-40 days. The exception is the tribe Aphaeini, which are nearly all dependent on ants, and have relatively long larval stages, lasting from 3-6 months or even more, passing through some six instars. The Lycaeninae which are not dependent on ants have four or five instars lasting some 18-45 days. In the Polyommatinae there are four or five instars and those species not dependent on ants have larval stages lasting only 18-40

days, but in the *Lepidochrysops*, which are dependent on ants, the larval stages last some 10-11 months.

One notable exception is the genus *Capys* (Theclinae). During spring and summer *Capys alphaeus* (Cramer), for example, has a larval stage of about 38 days, but towards the end of summer the final instar does not pupate but goes into diapause. They remain in diapause over the cold winter months finally pupating in spring without feeding again. The species of this genus differ from those of other non dependent myrmecophilous ones in that the larval stages occur within a protea flower head. The larva is relatively well protected in a chamber eaten out of the base of the flower head. Thus it occurs in conditions simulating those of an ant's nest. These larvae are occasionally attended by ants but are not dependent on them.

I think it can be assumed that the ant associated species evolved from free living forms. If this is the case it appears that it is possibly the relaxation of certain selective pressures caused by the presence of the ants that has resulted in the longer larval period. Most authors seem to agree that the presence of the ants afford the lycaenid larvae some protection from predation and parasitism. It is possibly this protection that led to the increased duration of the larval stages of ant assocated species.

The increased larval period in some ant associated lycaenid species is due to the fact that the larvae will undergo diapause when food becomes scarce. Some larvae, even if on the verge of pupation, will undergo diapause if the conditions become unfavourable. Only with the return of favourable conditions will they pupate. This ability to undergo diapause and remain in the larval stage for considerable periods of time appears to be an adaptation to life within an ants' nest. If the ants happened to move their nest for some reason the lycaenid caterpillars can follow or be carried while pupae would be left behind. Claassens and Dickson (1977) found that lifting stones while searching for *Aloeides thyra* (L.) larvae often led to the ants deserting their nests and leaving the lycaenid pupae behind. These pupae would be in danger in the deserted nest as the tunnels and exit holes may become filled without the ant's constant maintenance, thus newly emerged adults may not be able to leave the nest. Claassens and Dickson (1977) found that the larvae of *A. thyra* would follow their host ant, *Acantholepis capensis*, if they deserted their nest.

It would appear from the above that some lycaenid larvae may have even developed slightly more extended larval stages as an adaptation to life within an ants' nest. The whole question of life history strategies is a complex story and only a thorough ecological study would provide the necessary evidence to identify the selection pressures which could have affected the early stages of the lycaenids.

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THE BRIGHT WAVE: IDEA OCHRATA SCOP. IN HERTFORDSHIRE. – A female of this very local moth was caught in one of our Harpenden light traps (Allotments, Site 34, O.S.Grid Ref. TL 134 134) on the night of 19/20 July 1983, and was determined by examination of the genitalia. Although this species is not known to be migratory, this individual had probably travelled from one of its coastal breeding grounds, since it is most unusual to find it inland. The exceptionally intense migratory activity by many species during part of last year would support this view. I am indebted to Mr. B. Skinner for helpful comments on the distribution and status of *I. ochrata.* – A. M. RILEY, Entomology Department, Rothamsted Experimental Station, Harpenden, Hertfordshire.